Can we rely on the removal of CO2 from the atmosphere to combat climate change?

7 December 2015 - Large scale carbon capture technology is not the answer to climate change

A new study has found that the implications and costs of using carbon capture technology on a large scale, mean that reducing greenhouse gas emissions is still essential if climate change is to be tackled and global temperature rise kept below 2 degrees.

A review article, led by the University of Aberdeen and co-authored by the Met Office, is published today in the journal *Nature Climate Change* and examines the potential environmental, economic and energy impacts of so-called negative emissions technologies i.e. techniques that remove carbon dioxide from the atmosphere.

CO_2 is the major driver of climate change. Nearly all the emission scenarios assessed by the Intergovernmental Panel on Climate Change (IPCC) that keep global average temperatures below 2 °C assume the large-scale removal of CO_2 from the atmosphere by the end of this century. The options considered include planting more trees, which soak up CO_2 as they grow, or crushing rocks that naturally absorb CO_2 and spreading them on soils so that they remove CO_2 more rapidly.

The main technology commonly assumed in future scenarios to remove carbon from the atmosphere is burning biomass for energy, capturing the CO_2 that would otherwise be released, and then storing it permanently deep below the ground. This technology is known as bioenergy with carbon capture and storage (BECCS).

But all these CO_2 removal techniques come with different costs and environmental effects and limitations. The review article considers the impacts of negative emission technologies on land use, greenhouse gas emissions, water use, Earth's reflectivity, and soil nutrient depletion, as well as the energy and cost requirements for each technology.

Chris Jones, Met Office Hadley Centre scientist, and co-author of the study said: "We have previously quantified the amount of Negative Emissions required to achieve 2 degrees and the numbers are big. 100s of giga-tonnes[1] of CO_2 must be removed and stored somewhere, and the longer we wait to cut emissions the greater the future burden of removal will be[2]."

"We simply don't know if deployment of negative emission technologies on that scale is feasible, so here we have tried to calculate the potential costs and implications of different approaches. It is clear that swift action to cut emissions now is vital".

The study finds that all negative emissions technologies have significant limitations and while we need to invest in research and development to try and overcome these limitations, the key message from our study is that we should not rely on these as-yet unproven technologies to save us in the future. Instead cuts in greenhouse gas emissions are needed to avoid a risky dependence on these technologies in the future.

The work was carried out by a team of 40 collaborators, including scientists from the Met Office and the University of Aberdeen, as a contribution to the Global Carbon Project,
http://www.globalcarbonproject.org/

[1.] a giga-tonne of CO2 (1 GtCO2) is 1 billion tonnes of CO2. Annual fossil fuel emissions are around 36 GtCO2 for 2015.

[2.] Gasser *et al*. previous study
http://www.nature.com/ncomms/2015/150803/ncomms8958/abs/ncomms8958.html

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